much more dorsally flattened, the lateral wings are strongly nerved towards the outer margin, instead of at the inner margin on the commissural side, and a remarkable layer of strengthening cells completely invests the seed cavity, instead of occurring in small isolated groups beneath each rib, all of which characters are shared with Heracleum. As of minor importance the habit of Pastinaca is not that of Peucedanum, but rather that of Heracleum. Pastinaca is thus characterized by the fruit and habit of Heracleum and the floral character of Peucedanum, and had better stand as an intermediate genus. The length of the oil-ducts, a character sometimes used, is far from constant. In Peucedanum they are generally as long as the fruit; in Pastinaca sometimes as long and sometimes shorter; in Heracleum generally about half as long, though sometimes nearly as long.

HERACLEUM L.—Fruit oval, somewhat narrowed at base: like *Pastinaca*, but with thick conical stylopodium (figs. 41, 42).—Tall stout perennial, with ternately compound leaves, deciduous involucre, white flowers, and obcordate petals, the outer ones commonly larger and 2-cleft.

1. **H. lanatum** Michx. Fl. i. 166. Woolly, stem grooved: leaflets broad, irregularly cut-toothed.—Wet ground, throughout the northern states, and as far south as North Carolina and Kentucky; also westward. Fl. June.

EXPLANATION OF PLATE III.—Figures 27, 29, 37, 39, 41, are $\times 4$; figures 31, 33, 35, are $\times 6\frac{1}{2}$; all cross sections are $\times 20$.

A Botanical Tramp through North Carolina.

GERALD M'CARTHY.

After spending some five or six days in botanizing in the Tar river country, I shipped my presses, etc., by wagon, to Newberne, about forty-five miles farther south, and followed on foot, with portfolio and box, prepared to collect along the way. The road over which my route lay extended for the greater part of the forty-five miles through a series of gum and cypress swamps. These swamps had been flooded by recent heavy rains, and were now aggregated into one vast quagmire. Long stretches of the road were covered, often to a depth of three feet, by the coffee-black water of the swamps, and in places was crossed by deep streams, which connected the basins of the different swamps. Bridges are

everywhere absent, the only means provided the foot-passenger for getting across such places being what is called the "foot-log." The foot-log causeway is a characteristic institution of subaqueous Carolina. It consists of logs, usually of bald cypress, strung across the stream, and supported at the ends by piles driven a few feet into the soft ooze beneath. The upper surface is chipped off, so as to furnish a level and slippery pathway of some twelve to sixteen inches breadth. Frequently, after getting half way across some wide lagoon or stygian stream, the wayfarer is confronted by a yawning chasm, where the connecting logs have been swept away by the rising flood. It may be, too, that the twilight is fast deepening into the Egyptian darkness of the cypress swamp. Then the belated traveler must wade if he can, swim if he must.

The most abundant trees of all this wet region are the valuable black gum and bald cypress. The latter often rises to a height of over one hundred feet, and attains a girth of twenty-five feet or more above the swollen base. Where the trunks are not overcrowded, each one is surrounded by a palisade of cypress knees. The use of these curious excrescences can perhaps be explained by some of our biologists. Some one has suggested that they are intended to protect the sapling tree from injury by floating ice, a service, indeed, they are well fitted to perform, only it must be remembered that ice and the current to give it momentum are both usually absent from cypress pools. It may be, however, that the swamp water, which has a strongly acid reaction, acting upon the soft, spongy texture of the wood, has something to do with the production of these apparently useless appurtenances, as well as the swollen base of the trunk itself.[1]

The cane, Arundinaria macrosperma, mingled with Scirpus lacustris, Typha latifolia, and Smilax laurifolia, forms an impenetrable jungle along each side of the road, which it would soon invade were it not for the corduroying process.

Separating the basins of the different swamps are ridges of higher ground, usually with clayey soil. These ridges are often treeless, and are then covered by rank-growing sedges and aquatics. Among the sedges I noticed the following: Cyperus strigosus, C. retrofractus, C. Haspan, C. rivularis, C. flavescens, C. flavicomus, and C. Grayii, Dulichium spathaceum, Fuirena squarrosa, Eleocharis tubercu-

[1] The ordinary function assigned to "cypress kness" is that they permit the access of air to the roots. Also see BOTANICAL GAZETTE, viii. 286.—EDS.

losa, Eriophorum Virginicum, Fimbristylis spadicea, Rhynchospora inexpansa, R. alba, R. oligantha, R. microcarpa, R. pallida, R. gracilenta, R. Torreyana and R. glomerata. R. corniculata is rather scarce, but increases southward. Dichromena leucocephala, D. latifolia, Scleria triglomerata, S. oligantha, S. Elliottii, S. gracilis and S. laxa abound. Of carices the most common are C. flavescens, C. vulpinoidea and C. lupulina. This genus is by no means so well represented as one would expect.

But the flora of these lonely swamps is, like the swamps themselves, rather monotonous. The collector will often get as complete a set of species in a single day as he can secure by a whole week's labor, even though he force his way, as the writer did,

"Through tangled juniper, beds of reeds,
Through many a fen where the serpent feeds,
And man never trod before."

There are very few grasses to be met with in the swamps, and these are of little interest. Panicum Crus-Galli, Agrostis vulgaris, Panicum dichotomum and Paspalum Floridanum are about all.

The shrubs and trees which sometimes cover the high ridges include Gordonia Lasianthus, Stuartia Virginica, Magnolia glauca, Cyrilla racemiflora, Oxydendron arboreum, Quercus aquatica, Q. Castanea, Alnus serrulata, Cupressus thyoides, Juniperus Virginiana, Acer rubrum, and one or two species of willow.

The Autumnal changes in Maple Leaves.

W. K. MARTIN AND S. B. THOMAS.

The results we would record in this paper were obtained from investigations conducted in the botanical laboratory of Wabash College. The work was done during the time of the autumnal changes, so that abundant and fresh material was constantly at hand. The object was chiefly to note the changes in the cell contents as the death of the leaf approached, and to localize, so far as possible, the changes in color.

The structure of the normal green maple leaf is shown in figure 1, consisting of the ordinary epidermal layer above and below, a single cell in depth, a single layer of rather